

**Work Order ID 59589**

Tuesday, June 08, 2010 11:43:25 AM

Page 1

Item ID: D350-748-241TRN

Accept

Revision ID:

Item Name: Crosstube Turning Detail

Start Date: 6/8/2010 Start Qty: 1.00

Required Date: 6/21/2010 Req'd Qty: 1.00

Cust Item ID:

Customer:

Reference:

Approvals:

Process Plan:

Date: 10-6-08

Tooling:

Date:

QC:

Date:

SPC (Y/N):

Date:

Run

Start

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool # Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

Draw Nbr

Revision Nbr

D350-748-241

Rev E

100

0.00



Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Fill tube with sand & install plugs on both ends as per Folio FA647  
2-Turn first side as per Folio FA647  
3- File transition lines smooth.

Q.M. 10-06-10

110

0.00



QC

QC1- Inspect dimensions to dimension sheet

Memo

0.00

Quality Control

Q.M. 10-06-10

120

0.00



Mori Seiki

MORI SEIKI CNC LATHE LARGE

Memo

0.00

Mori Seiki CNC Lathe Large

1-Turn second side as per Folio FA647  
2- File transition lines smooth.  
3-Scribe part # as per Dwg D350-748-241

Q.M. 10-06-10

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

Resolution: \_\_\_\_\_ Disposition: \_\_\_\_\_ QA: N/C Closed: \_\_\_\_\_ Date: \_\_\_\_\_

NCR:		WORK ORDER NON-CONFORMANCE (NCR)						
DATE	STEP	Description of NC Section A	Corrective Action Section B			Verification Section C	Approval Chief Eng	Approval QC Inspector
			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

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Customer:




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Approvals: Process Plan: \_\_\_\_\_ Date: \_\_\_\_\_ Tooling: \_\_\_\_\_ Date: \_\_\_\_\_

Run Start

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/ Work Center ID	Operation Description	Set Up/ Run Hours	Tool ID	Tool #	Plan Code	Accept Qty	Reject Qty	Reject Number	Insp. Stamp
130  QC Quality Control	QC1- Inspect dimensions to dimension sheet  Memo	0.00  0.00							<u>Q.A</u> <u>10-06-10</u> <u>(1)</u>
140  QC Quality Control	QC8- Inspect parts - second check  Memo	0.00  0.00							<u>(IX)</u> <u>2</u> <u>MB</u> <u>10-06-10</u>
150  Crosstubes Crosstubes	Large Fab  Memo Grind machining marks.	0.00  0.00							<u>1</u> <u>—</u> <u>AWH</u> <u>10-06-21</u>

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Run Start

QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

Sequence ID/  
Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool # Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

160

Outsource process - Heat Treat

0.00



Outsource1

Memo

0.00

Outsource process - Heat Treat

Issue P/O: 12209  
Heat Treat to min 180 KSI As per Dwg D350-748-241  
Sand Blast tube after Heat Treat  
Possible Supplier: Vac Aero  
Ensure Certificate of Conformity is attached

CY 10/17/06

170

Receive &amp; Inspect for Damage &amp; Mat'l Certs

0.00



Packaging

Memo

0.00

Packaging

Ensure certificate of conformaty is attached

P 10/17/22

180

QC6- Inspect dimensions to drawing

0.00



QC

Memo

0.00

Quality Control

5 10/07/23Ⓢ

W/O:		WORK ORDER CHANGES					
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QC: \_\_\_\_\_ Date: \_\_\_\_\_ SPC (Y/N): \_\_\_\_\_ Date: \_\_\_\_\_

Stop

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Work Center IDOperation  
DescriptionSet Up/  
Run Hours

Tool ID

Tool # Plan  
CodeAccept  
QtyReject  
QtyReject  
NumberInsp.  
Stamp

190

0.00



Packaging

Packaging

Memo

0.00

Packaging

Identify and stock in kanban rack

Location: 46

DP 10-8-5

200

0.00



QC

QC21- Final Inspection - Work Order Release

Memo

0.00

Quality Control

10/08/05  
mf  
10-08-05

**Dart Aerospace Ltd**

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**NOTE:** Date & initial all entries



# Picklist Print

Tuesday, June 08, 2010 11:43:29 AM

Page 1

Work Order ID: 59589



Parent Item: D350-748-241TRN



Parent Item Name: Crosstube Turning Detail

Start Date: 6/8/2010

Required Date: 6/21/2010

Comments: IPP Rev:A New Issue 08-03-06 DD verified by:ec  
 IPP Rev B Removed polish 08.04.02 EC verified by : DD  
 IPP Rev C Removed LPS-3 08.06.23 Ec verified by: DD

Start Qty: 1.00

Required Qty: 1.00

Component Item ID/	Replacement	Mfg/	Bin	Primary	Last	Route	Unit of	Qty on	Qty per Kit	Total	Qty	Date	Status
D6018-125		Manufactured	No			120	Each	50.0000	1	1			



Crosstube Material



AM 10-06-10 ①

Location

Loc Qty

Loc Code

LG

50

32913

50

1

W/O:		WORK ORDER CHANGES					
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

**NOTE:** Date & initial all entries

<b>DART AEROSPACE LTD</b>		<b>Work Order:</b> 59589
<b>Description:</b> Crosstube Assembly (AS350/355 High Aft)		<b>Part Number:</b> D350-748-241
<b>Inspection Dwg:</b> D350-748-241 <b>Rev:</b> D		<b>Page 1 of 1</b>

### FIRST ARTICLE INSPECTION CHECKLIST

☒ First Article
 ☐ Prototype

Inspection Sheet	Drawing Dimension	Tolerance	Actual Dimension	Accept	Reject	Method of Inspection	Comments
SIDE A	2.240	+0.005/-0.000	2.245	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.208	+0.005/-0.000	2.185	/			
	2.234	+0.005/-0.000	2.239	/			
	2.253	+0.005/-0.000	2.258	/			
	2.272	+0.005/-0.000	2.277	/			
	2.299	+0.005/-0.000	2.304	/			
	0.063	+/-0.010	0.063	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
SIDE B	2.240	+0.005/-0.000	2.240	/			
	2.180	+0.005/-0.000	2.185	/			
	2.180	+0.005/-0.000	2.185	/			
	2.208	+0.005/-0.000	2.213	/			
	2.234	+0.005/-0.000	2.239	/			
	2.253	+0.005/-0.000	2.258	/			
	2.272	+0.005/-0.000	2.277	/			
	2.299	+0.005/-0.000	2.304	/			
	0.063	+/-0.010	0.063	/			
	4.26	+/-0.030	4.260	/			
	R0.063	+/-0.010	R0.063	/			
	R0.50	+/-0.030	R0.500	/			
	122.70	+/-0.060	122.700	/			

<b>Measured by:</b> C.M.	<b>Audited by:</b> MB	<b>Prototype Approval:</b>	N/A
<b>Date:</b> 10.06.10	<b>Date:</b> 10-06-10	<b>Date:</b>	N/A

Rev	Date	Change	Revised by	Approved
A	07.01.17	New Issue (P/O D350-748-201)	KJ/JLM	

W/O:			WORK ORDER CHANGES					
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			Initial Chief Eng	Action Description Chief Eng	Sign & Date			

NOTE: Date & initial all entries

Item	Qty	Part Number	Description
	-241		
1	X	D350-748-241	CROSSTUBE ASSEMBLY (AS 350/355 HI AFT)
2	1	D6018-125	CROSSTUBE
3	2	D3502-1	SUPPORT
4	2	D2856-400-710	ABRASION STRIP
5	1	AELS-1032-225	INSERT
6	1	NAS1149D0363J	WASHER (OR AN960JD10)
7	2	MS21920-20	CLAMP (PER DART SPEC. M-MS21920-20)
8	1	MS27039-1-10	SCREW

# **GENERAL NOTES:**

- 1) MATERIAL: MANUFACTURED FROM D6018-125  
FINISHED LENGTH = 122.700±0.06
- 2) FINISH: MAGNETIC PARTICLE INSPECT PER DART QSI 038 4.2  
CADMIUM PLATE PER AMS-QQ-P-416B, CLASS 1, TYPE II  
PRIME INSIDE AND OUTSIDE PER DART QSI 005 4.2  
PAINT OUTSIDE PER DART QSI 005 4.2
- 3) TOLERANCES ARE PER DART QSI 018 UNLESS OTHERWISE NOTED.
- 4) UNITS: INCHES UNLESS OTHERWISE NOTED.
- 5) BREAK SHARP EDGES: 0.005 TO 0.010 MAX.
- 6) IDENTIFICATION: SCRIBE DART PART NUMBER "D350-748-241" AND BATCH NUMBER ON INSIDE OF CUFF USING VIBRATING STYLUS.
- 7) WEIGHT: 29.85 lbs
- 8) PART IS SYMMETRIC ABOUT CENTERLINE, EXCEPT FOR Ø0.297 HOLE.
- 9) RUN CUTTER OFF PART WHERE INDICATED. BLEND OUT ALL EDGES FROM MACHINING LONGITUDINALLY, TRANSITION SHOULD BE SMOOTH. NOTE: ALL HOLES ARE DRILLED AFTER BENDING.
- 10) BEND PROGRESSIVELY WITH A MINIMUM OF 7 PASSES. MAXIMUM TUBE FLATTENING DUE TO BENDING IS 6% BASED ON O.D.
- 11) HEAT TREAT TO MIN. 180 KSI PER MIL-T-6736 OR AMS 2759-1C AFTER TURNING.
- 12) INSTALL D2856-400-710 ABRASION STRIPS WITH A GAP ON BOTTOM SIDE OF CROSSTUBE, CENTERED OPPOSITE D3502-1 SUPPORT, PER QSI 035.
- 13) EXTREME CARE MUST BE TAKEN TO PROTECT THE OUTSIDE SURFACE OF THE TUBE. THE OUTSIDE SURFACE MUST BE SMOOTH AND FREE FROM SURFACE DEFECTS SUCH AS SCRATCHES, NICKS, OR DENTS. DEFECTS UP TO 0.005" MAY BE BLENDED OUT LONGITUDINALLY. CIRCUMFERENTIAL GRIND MARKS ARE UNACCEPTABLE. WHEN DRILLING HOLES EXTREME CARE MUST BE TAKEN AND CAREFUL DEBURRING PERFORMED TO ENSURE A CLEAN HOLE WITH NO CRACKING/CHIPPING/GROOVES.
- 14) TORQUE CLAMPS 60 TO 80 IN-LB. ENSURE AT LEAST 1.5 THREADS SHOWING IN SAFETY AND THAT NUT HAS NOT BOTTOMED-OUT AFTER TORQUING.

SHOP COPY  
RETURN TO  
ENGINEERING  
UNCONTROLLED COPY  
SUBJECT TO AMENDMENT  
WITHOUT NOTICE  
WORK ORDER  
NO. 39589  
280-6-05

**RELEASED**  
2009-10-29

E	REVISE GENERAL NOTES: UPDATE TO CURRENT STANDARDS; RELOCATED FLAG #6 PER PAR 08-046 (ZN A8-3); ADD TOLERANCES (ZN C6-3, D2-3)	RF	09.09.30
D	MAG. PARTICLE AND CAD PLATE AS MFD.	CP	06.10.31
C	ADD CAD PLATING	CP	06.08.14
B	ADD D6018-125 & PRIME AND PAINT	CP	06.06.30
A	NEW ISSUE	CP	06.03.31
REV.	DESCRIPTION	BY	DATE
DESIGN	RF	<b>DART AEROSPACE LTD</b> HAWKESBURY, ONTARIO, CANADA	
DRAWN	RF		
CHECKED	RF	DRAWING NO.	REV. E
MFG. APPR.	RF	D350-748-241	SHEET 1 OF 4
APPROVED	RF	TITLE	SCALE
DE APPR.	RF	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD THIS DOCUMENT IS PRIVATE AND CONFIDENTIAL AND IS SUPPLIED ON THE EXPRESS CONDITION THAT IT IS NOT TO BE USED FOR ANY PURPOSE OR COMMUNICATED TO ANY OTHER PERSON WITHOUT WRITTEN PERMISSION FROM DART AEROSPACE LTD.	

W/O:		WORK ORDER CHANGES					
DATE	STEP	PROCEDURE CHANGE	By	Date	Qty	Approval Chief Eng / Prod Mgr	Approval QC Inspector

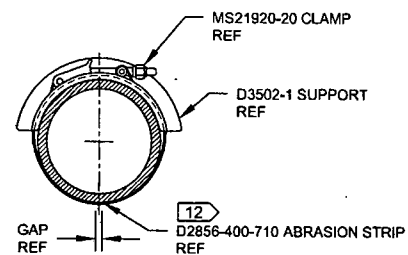
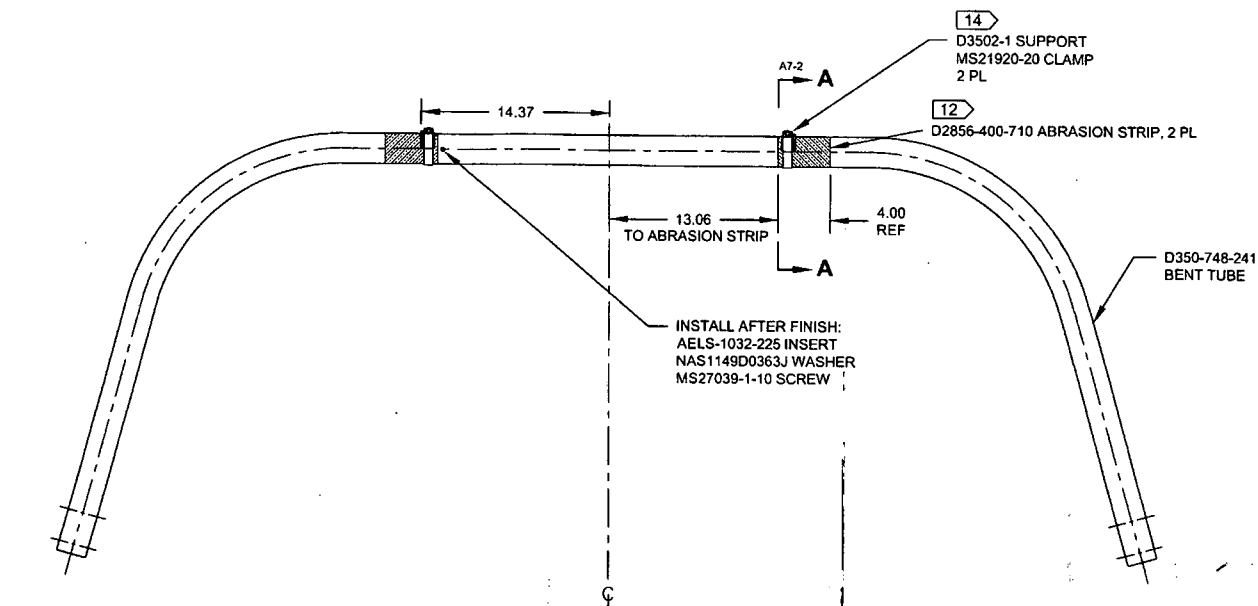
Part No: \_\_\_\_\_ PAR #: \_\_\_\_\_ Fault Category: \_\_\_\_\_ NCR: Yes No DQA: \_\_\_\_\_ Date: \_\_\_\_\_

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**D350-748-241  
ASSEMBLY DETAIL**



w/o 59589

**RELEASED**  
2009-10-29  
MD

DESIGN	90	<b>DART AEROSPACE LTD</b>	
DRAWN	RF	HAWKESBURY, ONTARIO, CANADA	
CHECKED	90	DRAWING NO.	REV. E
MFG. APPR.	90	D350-748-241	SHEET 2 OF 4
APPROVED	90	TITLE	SCALE
DE APPR.	90	CROSSTUBE (AS 350/355 HI AFT)	NTS
DATE	09.09.30	COPYRIGHT © 2006 BY DART AEROSPACE LTD	
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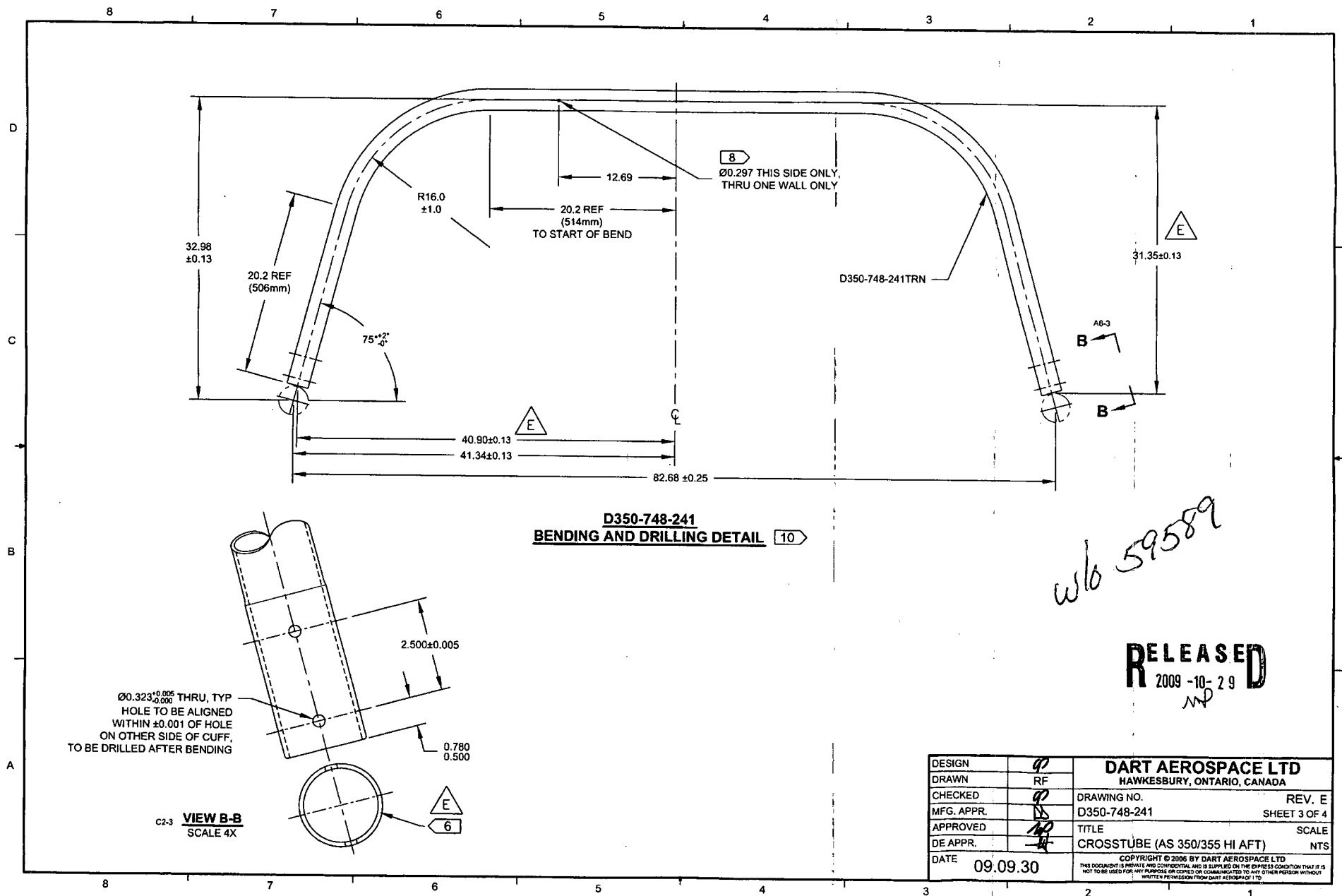
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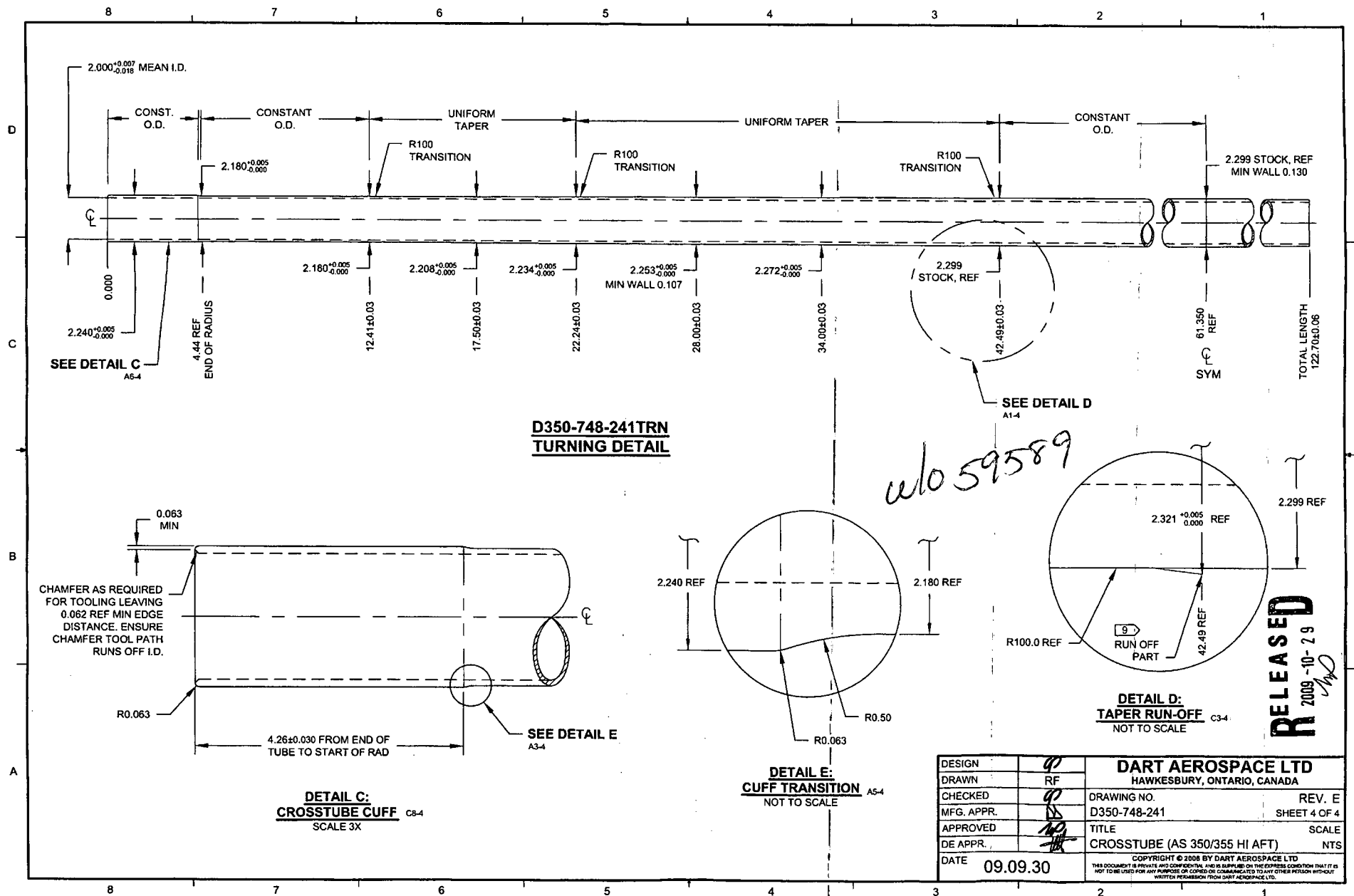
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VAC AERO  
INTERNATIONAL INC.

RELEASE NOTE

GST No.: R105468102

OAK 121151-1



HEAD OFFICE  
1371 SPEERS ROAD, OAKVILLE, ONTARIO  
CANADA L6L 2X5  
TEL: (905) 827-4171 FAX: (905) 827-7489



2009 WYECROFT ROAD, UNIT B  
OAKVILLE, ONTARIO  
CANADA L6I 6J4  
TEL: (905) 827-7377 FAX: (905) 827-1380



QUEBEC DIVISION  
7450 RUE VÉRITÉ STREET, ST. LAURENT, QUÉBEC  
CANADA H4S 1C5  
TEL: (514) 334-4240 FAX: (514) 334-6269

07/16/2010

MM / DD / YYYY

PAGE: 1

1DAR01

ILL TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

SHIP TO: DART AEROSPACE LTD.  
1270 ABERDEEN ST.  
HAWKESBURY, ON

K6A 1K7

K6A 1K7

DATE SHIPPED	SHIP VIA	F.O.B.
07/16/2010		ORIGIN
CUSTOMER P/O No.	JOB No.	TERMS
PO12209		NET 30 DAYS

PART No.	DESCRIPTION	UOM	QTY ORD	QTY SHPD	TEST RESULTS
----------	-------------	-----	------------	-------------	--------------

D350-748 CROSS TUBE EA 16 16

Process Specifications: Procedure: 4353  
HEAT TREATED TO 180 KSI MIN. PER AMS 2759-1E  
100% HARDNESS TESTED AS PER ASTM E-18, 40-45 HRC  
MATERIAL: 4130  
SAND BLASTED AFTER HEAT TREAT

Sc 10/12/23

P/N: D350-748-141: 59325, 59326, 59327, 59328, 59329, 59330, 59331, 59332

P/N: D350-748-241: 59586, 59588, 59589, 59549, 59587, 59550, 59551, 59552

100% HARDNESS TESTED

16 pcs

42/43 HRC



hereby certify that the material covered by this release note has been inspected and tested and conforms to all specifications relevant hereto in accordance with the conditions of the contract / or purchase order.

ON BEHALF OF VAC AERO INTERNATIONAL INC.



METAL TREATING INSTITUTE

*James Robinson*  
Authorized Q.C. Inspector



Heat Treating • Welding

VACUUM BRAZING • HEAT TREATING • SPECIAL PROCESSING • FURNACE EQUIPMENT  
TURBINE COMPONENT OVERHAUL • PLASMA AND OTHER COATINGS